

ATLANTIC WHITE CEDAR WETLANDS IN WEST-CENTRAL GEORGIA

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ABSTRACT

In west-central Georgia, a disjunct metapopulation of Atlantic White Cedar *Chamaecyparis thyoides* (L.) BSP. occurs, forming distinct wetland communities that define habitat for other rare and endangered plant species. Regional distribution of White Cedar communities in west-central Georgia was analyzed and characterized by floristic composition and stand structure. These wetlands have an extremely localized and patchy distribution and take on several characteristics in this region ranging from younger mono-dominant stands to mixed species stands with a small number of very large White Cedar specimens. White Cedar is an important early successional species, colonizing or regenerating after disturbance, including fire and flooding.

INTRODUCTION

Forty seven percent of the wetlands in the lower 48 states are located in the Southeast with wetlands covering 16 percent of the regional landscape (Hefner et al, 1994). These wetlands are among the most diverse and productive ecosystems in the country. Georgia's abundant wetlands support high levels of biological diversity, including a large number of rare plant communities and endangered species. Atlantic White Cedar wetlands are rare plant communities throughout their range and, in Georgia, found only in restricted habitats. The purpose of this study is to determine the regional distribution and pattern of White Cedar wetlands and characterize the wetland floristic composition and stand structure of Atlantic White Cedar.

Atlantic White Cedar

Chamaecyparis thyoides (L.) BSP.

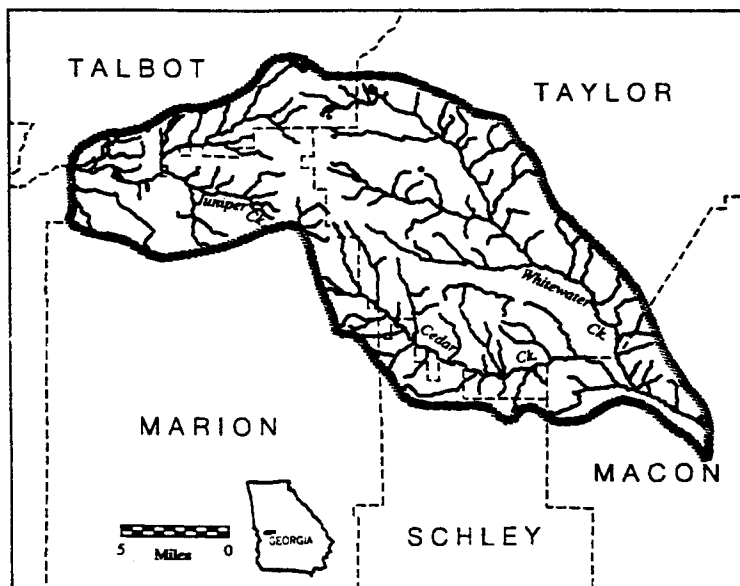
Atlantic White Cedar is a coniferous forest tree of the Cypress family found in coastal areas or in freshwater swamps (Laderman, 1987). Geographical

range is along a narrow coastal belt from central Maine south into Mississippi. The tree species typically grows in low elevations with an acidic peat or muck soil type. Atlantic White Cedar often occurs in distinct bog communities, growing in pure, dense stands but may also be found with other forest cover types, including sweetbay (*Magnolia virginiana*), swamp redbay (*Persea palustris*), and pine species (*Pinus taeda*, *Pinus serotina*).

Atlantic White Cedar Wetlands

Atlantic White Cedar is characteristic of this forested wetland type, forming dense stands. These wetlands are usually found along blackwater streams, peat bogs, floodplain terraces or seep slopes. There is a wide variability in community characteristics and plant composition, depending on the region and stage of succession. The maintenance of the Atlantic White Cedar species and wetland type is highly dependent on allogenic disturbance. In Georgia, Atlantic White Cedar is reported from six counties with the largest wetland complexes occurring in the west-central Fall Line Sandhills within the Flint and Chattahoochee watersheds (Figure 1).

Figure 1. Atlantic White Cedar Study Area



METHODS

Atlantic White Cedar communities were delineated by using color infrared aerial photos, field checks, historical records and an aerial survey. During preliminary surveys we found that the majority of the Atlantic White Cedar communities were found along two minor tributaries of the Flint and Chattahoochee Rivers. These two tributaries, Cedar Creek and Whitewater Creek, were chosen for detailed GIS mapping, using ArcView software. Hydrography and wetland layers were overlayed with delineated White Cedar communities.

Field surveys were conducted along Whitewater and Little Whitewater Creek. Two random 50m X 5m transects were located along sections of the creek system that represented different stages of successional development. Vegetation profiles and environmental characteristics were recorded along with DBH measurements for Atlantic White Cedar. Additional field checks were used to further describe wetland development patterns.

RESULTS AND DISCUSSION

Figures 2 and 3 demonstrate the pattern of Atlantic White Cedar wetlands along Whitewater and Cedar Creek. The wetlands are shown to be highly fragmented and relatively narrow, resulting in part

from the incised topography and limited moisture availability of the sand substrate. The larger stands of Atlantic White Cedar occurred along the main channel of the creeks where moisture appeared to be more readily available. Seepage slopes were common on both creek systems, usually adjacent to the creek channels, contributing a constant moisture flow. Both creek channels were shallow (<4 ft. deep) and narrow (<12 ft. wide) with extremely dense vegetation cover.

The dominant wetland types were forested wetlands followed by scrub-shrub and emergent wetlands. The forested wetland classification ranged from pure hardwoods to mixed species to pure evergreen species. Atlantic White Cedar could be found at various stages of development in conjunction with a number of wetland types. Peat accumulations were present but not extensive or well developed. Representative soil types were typical Quaternary alluvium, ranging from silty fine sands to poorly sorted coarse grained sands with undeveloped layers of organic matter.

The size and configuration of landscape patches have important implications for species population dynamics and wetland development (Forman and Godron, 1986). Patch context refers to the interactions between the components of the patch and the components of the surrounding landscape mosaic. The degree of connectivity between landscape types can also affect the interactions and dynamics of their components. The limited extent and large perimeter to

Figure 2. Whitewater Creek Wetland Distribution

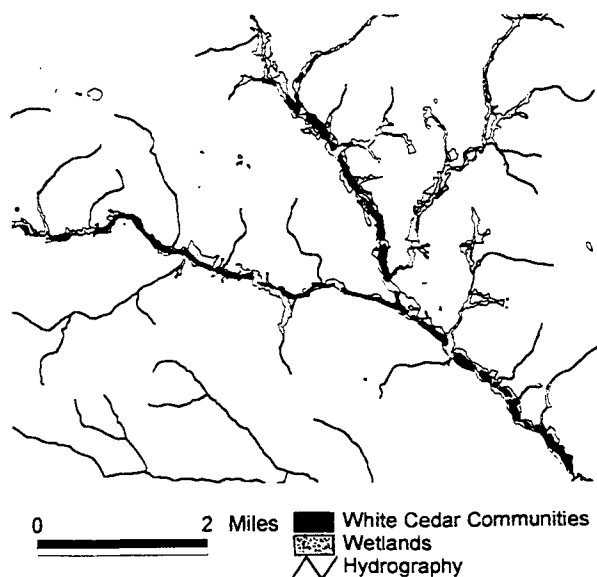
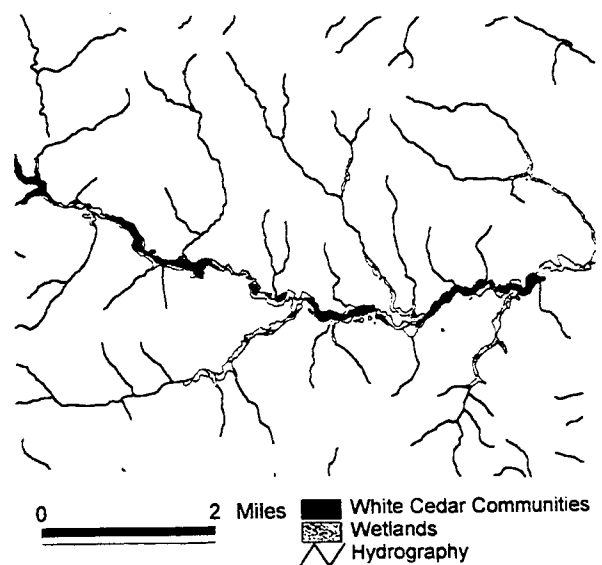


Figure 3. Cedar Creek Wetland Distribution



extent and large perimeter to area ratio for Atlantic White Cedar wetlands make them vulnerable to environmental changes, especially human impact.

The vegetation profile of Whitewater Creek demonstrates the change in floristic species as one moves away from the creek channel (Figure 4). At creekside, species found in the wetland include Atlantic White Cedar (*Chamaecyparis thyoides*), sweet bay (*Magnolia virginiana*), swamp red bay (*Persea palustris*) with a dense understory of titi (*Cyrilla racemiflora*) and fetterbush (*Leucothoe axillaris*). Pine and oak species are often found as the ecotone into the uplands can be abrupt, with few transitional species. Longleaf pine (*Pinus palustris*), Turkey Oak (*Quercus laevis*), and wiregrass (*Aristida beyrichiana*) dominate the uplands and is characterized as a xeric, fire adapted community with an open canopy and little understory (Wharton, 1989). The uplands of this region have experienced the greatest human impact from forestry and range management.

Infrequent fire frequency has been explained as a major factor in the maintenance of Atlantic White Cedar wetlands (Laderman, 1987). While the dry uplands were certainly exposed to frequent fires it is uncertain exactly what role fire played in wetland processes. Hydrology appears to have a major influence on the Atlantic White Cedar and its associated wetland. Atlantic White Cedar is an early successional species, dependent on natural disturbances, such as fire or flooding, to maintain open areas for regeneration. Without such disturbances, shade tolerant hardwood species, such as sweet bay or swamp red bay, would flourish. Light and moisture are important limiting factors for successful White Cedar seedlings (Burns and Honkala, 1990).

Data from the two transects demonstrate the possible importance of hydrology in Atlantic White Cedar maintenance. Figure 5 exhibits tree diameter distributions of four species along a portion of Whitewater Creek that has not experienced significant fire or flooding disturbance in many years. This community is experiencing a successional change towards hardwood species with no White Cedar regeneration. Only adult specimens of the tree remain.

Figure 6 shows diameters for tree species that are growing in an area that had been a beaver pond until 1995, when flooding had destroyed the beaver dam, leaving behind an area free of vegetation. Atlantic White Cedar seedlings dominate with few other species present and no species with large diameters. The dense seedling presence is not yet thin enough to allow the shrub layer to develop.

Figure 4. Vegetation profile of Whitewater Creek

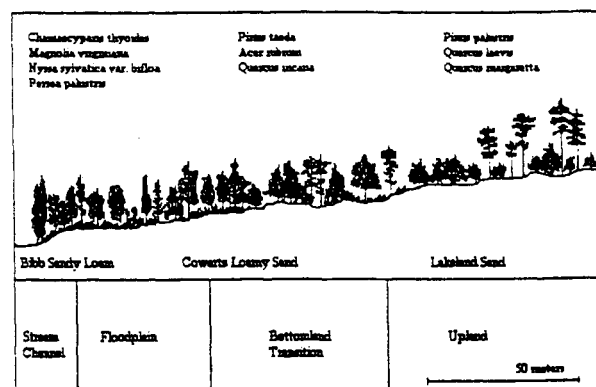


Figure 5. Diameter-class distributions: Site 1

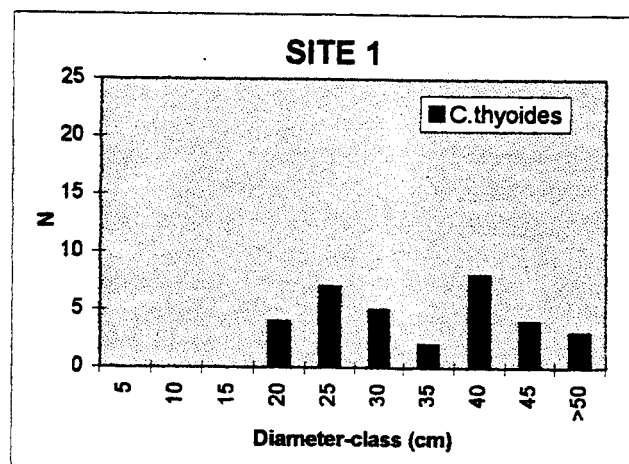
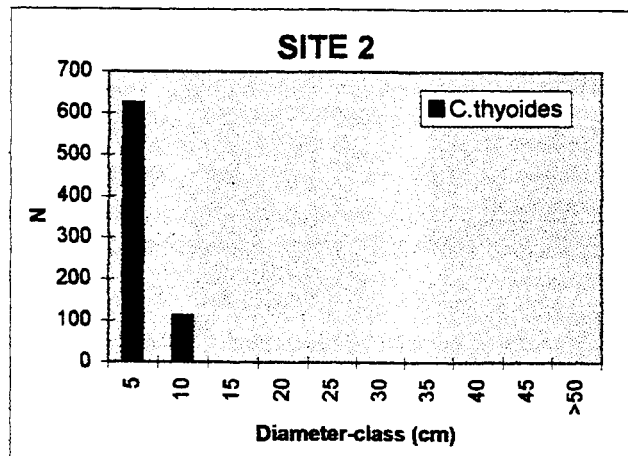


Figure 6. Diameter-class distributions: Site 2



Natural disturbances appear to be an important part of the hierarchical processes involved in the wetland development and maintenance in the sandhills. Little hydrological data exists for these creek systems with landowners providing anecdotal evidence. Additional research is needed to fully understand the roles of hydrology and fire in these communities. Further research is also needed into the life histories and population dynamics of the other rare species found in Atlantic White Cedar wetlands.

Ten rare and endangered species have been identified in these wetlands (Sheridan, Orzell and Bridges, 1998; Patrick, Allison, and Krakow, 1995). The author documented one state endangered plant species (*Sarracenia rubra*) and one state threatened plant species (*Pinguicula primuliflora*). Table 1 lists both the characteristic and rare species of Atlantic White Cedar wetlands of west-central Georgia.

CONCLUSION

The protection of these rare and fragile wetland systems and their associated plant species depends on the proper understanding of the processes that influence their structure. Only then can we implement the proper management strategies to ensure their survival. Human activities, including stream alteration and bank vegetation removal can lead to excessive erosion and hydrological changes that may lead to community degradation. Poor practices in timber harvesting, agriculture, range management and road construction all have the potential to change this ecosystem. Riparian buffers and conservation easements are potential methods to help preserve this rare wetland.

ACKNOWLEDGEMENTS

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Table 1. White Cedar Community List

TREES

<i>Chamaecyparis thyoides</i>	<i>Nyssa sylvatica</i> var. <i>biflora</i>
<i>Magnolia virginiana</i>	<i>Pinus taeda</i>
<i>Acer rubrum</i>	<i>Persea palustris</i>
<i>Liriodendron tulipifera</i>	<i>Pinus serotina</i>

SHRUBS

<i>Cyrilla racemiflora</i>	<i>Myrica cerifera</i>
<i>Lyonia lucida</i>	<i>Ilex glabra</i>
<i>Ilex coriacea</i>	<i>Leucothoe axillaris</i>
<i>Cliftonia monophylla</i>	<i>Toxicodendron radicans</i>
<i>Rhododendron nudiflorum</i>	<i>Vaccinium formosum</i>
<i>Clethra alnifolia</i>	<i>Smilax laurifolia</i>
<i>Smilax rotundifolia</i>	<i>Myrica heterophylla</i>

RARE AND ENDANGERED PLANTS

<i>Carex collinsii</i>	<i>Carex venusta</i> var. <i>venusta</i>
<i>Fothergilla gardenii</i>	<i>Chamaecyparis thyoides</i>
<i>Helenium breuifolium</i>	<i>Helianthis longifolius</i>
<i>Kalmia carolina</i>	<i>Pinguicula primuliflora</i>
<i>Sarracenia rubra</i>	<i>Schoenoplectus etuberculatus</i>

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